

## A new species of *Xyliphius*, a rarely sampled banjo catfish (Siluriformes: Aspredinidae) from the rio Tocantins-Araguaia system

Carlos A. Figueiredo<sup>1,2</sup> and Marcelo R. Britto<sup>2</sup>

*Xyliphius anachoretetes*, a new species of aspredinid catfish is described from the Tocantins-Araguaia River system. *Xyliphius anachoretetes* is diagnosed by the presence of six developed retrorse serrae on posterior border of pectoral-fin spine, presence of papillae on the lower lip bearing minute branches, and only two dorsal procurvent rays. Comments about the informativeness of character-state variation among *Xyliphius* species and aspredinid related genera are furnished. Also, a brief discussion about conservation status of the new taxon is made.

*Xyliphius anachoretetes*, uma nova espécie de bagre aspredinídeo é descrita para o sistema Tocantins-Araguaia. *Xyliphius anachoretetes* é diagnosticado pela presença de seis serras retrorsas desenvolvidas na borda posterior do espinho da nadadeira peitoral, presença de papilas no lábio inferior apresentando minúsculas ramificações, e somente dois raios pró-correntes dorsais. Comentários sobre a informação contida na variação de estados de caráter entre as espécies de *Xyliphius* são fornecidos. Além disso, uma breve discussão sobre o estado de conservação do novo táxon é feita.

**Key words:** *Xyliphius*, Serra da Mesa Dam, Brazilian shield.

### Introduction

The banjo catfish genus *Xyliphius* was established by Eigenmann (1912) to include a single species, *X. magdalenae* Eigenmann, from rio Magdalena basin, Girardot, Colombia. That description was based on a single specimen, 32.0 mm SL. Later, four species were described in a short time frame: *X. lepturus* and *X. melanopterus* from western headwaters of rio Bobonaza, upper Amazon basin (Orcés, 1962), *X. barbatus* (Alonso de Arámburu & Arámburu, 1962), and *X. lombarderoi* (Risso & Risso, 1964), from rio Paraná, in Argentina. A sixth species, *X. kryptos*, was described by Taphorn & Lilyestrom (1983), from rio Aricuaisá, lago de Maracaibo basin, Venezuela. Further collections, though small, expanded the distribution of species of *Xyliphius* beyond their type localities (Cala,

1977). Currently, the six nominal species of *Xyliphius* are known from northern South America in the rio Magdalena system (*X. magdalenae*), lago de Maracaibo (*X. kryptos*), and western headwaters of the Amazonas basin and rio Orinoco (*X. lepturus* and *X. melanopterus*), and from southern South America in the rio de La Plata system (*X. barbatus* and *X. lombarderoi*) (Taphorn & Lilyestrom, 1983; Galvis *et al.*, 1997; Calviño & Castello, 2008).

Only Friel (1994) has completed a phylogenetic analysis of Aspredinidae. He recognized *Xyliphius* as the sister group of the tribe Hoplomyzontini, composed of the genera *Hoplomyzon* Myers, *Micromyzon* Friel, *Dupouyichthys* Schultz and *Ernstichthys* Fernández-Yépez. A formal diagnosis of the genus *Xyliphius* has not been published in a peer-reviewed journal, but all species described so far share the

<sup>1</sup>Núcleo de Gestão Ambiental, Instituto de Biociências, Universidade Federal do Estado do Rio de Janeiro. Av. Pasteur, 458, sala 512-F, 22290-240 Rio de Janeiro, RJ, Brazil. carlos.figueiredo@gmail.com

<sup>2</sup>Departamento de Vertebrados, Museu Nacional/Universidade Federal do Rio de Janeiro. Quinta da Boa Vista, s/n, 20940-040 Rio de Janeiro, RJ, Brazil. mrbritto2002@yahoo.com.br

following exclusive features among aspredinids (Friel, 1994): eyes highly reduced; premaxilla toothless and displaced lateral to mesethmoid; row of fleshy papillae projecting anteriorly from lower lip; *unculi* and *unculiferous* tubercles flattened; lamina of pterotic rounded; and lateral end of posterohyal expanded. Other characters not unique to this taxon but useful for identification include: anterior nare opening with fleshy papillae; coronomeckelian bone absent; Meckel's cartilage with high ascending process; and pre-axial serrations absent.

Extensive fish surveys of the upper rio Tocantins system from 1996-2003 yielded a single specimen of *Xyliphius* from the mouth of the rio Preto. Two years later (2005), another single, small specimen (25.6 mm SL) of the genus was discovered in the rio Araguaia basin, nearly 195 km from the first locality. Examination of both specimens confirms their conspecificity and distinctiveness from nominal *Xyliphius*. This new species described herein is the first *Xyliphius* from lower Amazon basin and first record of the genus for the central portion of Brazilian shield.

Despite seven years of intensive collection efforts during fish surveys of the Serra da Mesa Dam from the same region where the holotype was collected, no other specimens were found. Specimens of another aspredinid species, however, *Bunocephalus* cf. *aleuropsis* were extensively collected in the same region and during the same period. This possibly indicates different life histories of these two aspredinids on the rio Tocantins-Araguaia system. Accordingly, at least in Venezuela, *Xyliphius* live buried in the sand and perhaps gravel of swift flowing streams, whereas *Bunocephalus* are typically found in slow moving streams, often among leaf litter (anonymous reviewer, pers. comun.).

### Material and Methods

Morphometric and meristic data were taken following Stewart (1985), plus prepectoral length, posterior internareal distance, length between anterior and posterior nares, length between posterior nare and orbit. Meristic data of paired fins were collected from both sides of the body. Number of oral papillae on lower jaw was counted along its entire border. Pectoral-spine serrae, procurrent caudal-fin rays and vertebral counts were taken from digital radiographs of the holotype, obtained by a Faxitron digital specimen radiography system model MX20-DC44. Vertebral counts include only free centra, with the compound caudal centrum (preural 1 + ural 1) counted as a single element. Osteological terminology follows Friel (1995), except that parieto-supraoccipital is used instead of supraoccipital (Arratia & Gayet, 1995). Specimens not available for direct observation were examined through photographs and/or radiographs. Institutional abbreviations are according to Ferraris (2007), plus CZUT-IC, Colección Zoológica, Universidad del Tolima, Colômbia; DU, Duke University, Vertebrate Collection, Durham, North Carolina, U.S.A.; OV, G. Orcés Villagomez particular collection, Quito, Ecuador.

### *Xyliphius anachoretetes*, new species

#### Fig. 1

**Holotype.** MNRJ 31923, 88.4 mm SL, Brazil, Goiás, rio Tocantins below the dam of Serra da Mesa Hydropower Plant, in a marginal pond at the mouth of rio Preto, an affluent of the right bank of rio Tocantins (currently under water of the Cana Brava Hydropower-plant reservoir), 13°37'51"S 48°07'01"W, collected in daylight, 3 Dec 1996, D. F. Moraes (Equipe Ímpar).

**Paratype.** MZUSP 89546, 25.6 mm SL, Brazil, Goiás, municípios de Crixás/Santa Terezinha de Goiás, rio Crixás-açu, under bridge at the state road GO-465, 14°26'26"S 49°42'37"W, 28 Jul 2005, Equipe CBE.

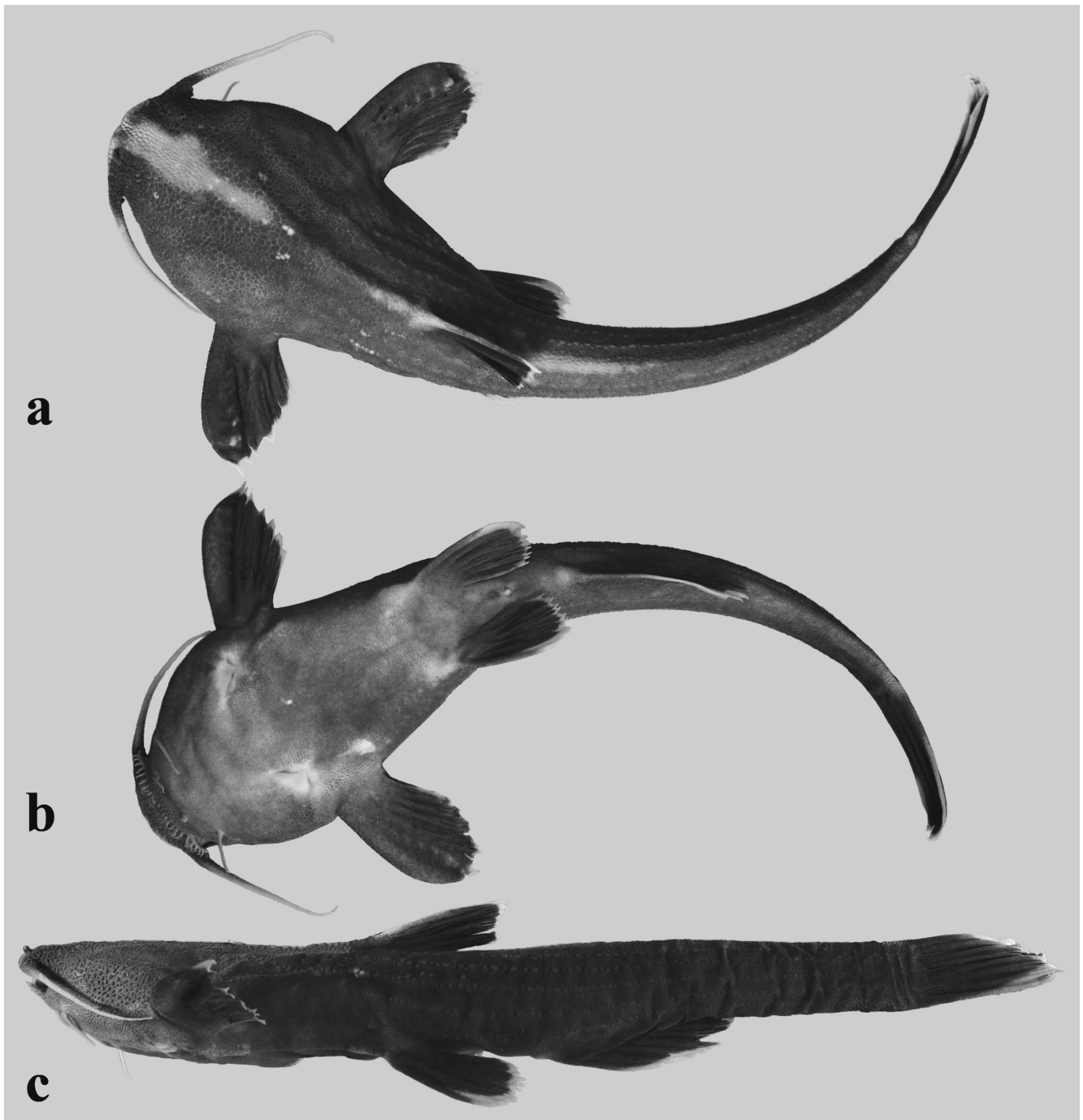
**Diagnosis.** *Xyliphius anachoretetes* is diagnosed from its congeners, except *X. magdalenae*, by the presence of six developed retrorse serrae along posterior border of pectoral spine (vs. 7-9 in *X. melanopterus* and *X. barbatus*, 8 in *X. lombarderoi*, 8-10 in *X. lepturus* and *X. kryptos*). *Xyliphius anachoretetes* differs from *X. magdalenae* by the lower number of total free vertebrae (31 vs. 33-36).

*Xyliphius anachoretetes* is further distinguished, except from *X. kryptos*, by papillae of lower lip bearing minute branches (vs. large branches in *X. lepturus*, *X. barbatus*, *X. lombarderoi*, and *X. melanopterus*, or unbranched papillae in *X. magdalenae*) (Fig. 2); and, except from *X. magdalenae* and *X. kryptos*, by the presence of 22 or 24 papillae on lower lip (vs. 25-28 in *X. lepturus*, 27-29 in *X. melanopterus*, 27-30 in *X. barbatus*, and 28 in *X. lombarderoi*).

Besides, *Xyliphius anachoretetes* is also promptly distinguished by the lower number of dorsal procurrent rays (two) from *X. lepturus* (four or five), *X. melanopterus* (three), and *X. magdalenae* (four).

**Description.** Morphometric data presented in Table 1. Head depressed, roughly triangular with bluntly rounded snout in dorsal view. Skull ornamentation inconspicuous. Dorsal profile straight from tip of snout to origin of caudal fin, except for shallow convexity from posterior tip of parieto-supraoccipital to posterior base of dorsal fin. Ventral profile convex from tip of snout to pectoral girdle region, then straight to pelvic-fin origin, shallowly concave from pelvics to anal-fin origin, ascending obliquely along anal-base and finishing straight along caudal peduncle. Body depressed anteriorly, becoming gradually compressed towards caudal fin. Entire body banjo-shaped in dorsal/ventral view, greatest width at cross-section through region just anterior to pectoral-spine insertions.

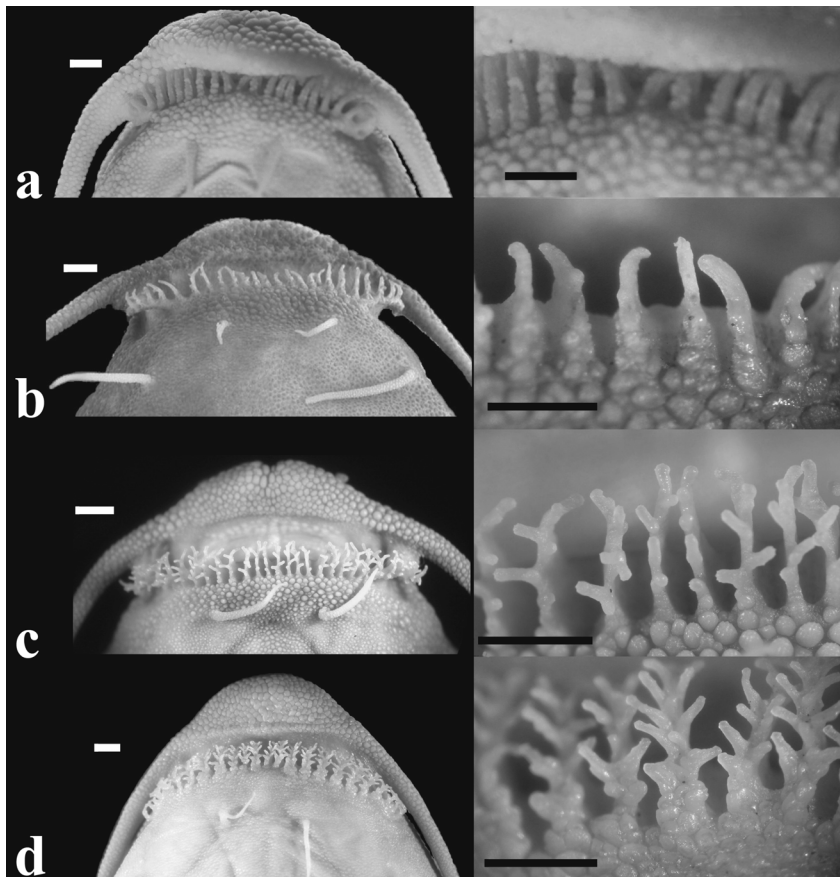
Eye very small, diameter 1.5% (holotype) or 2.4% (paratype) of head length, without free orbital margin; located dorsally in anterior half of head. Two nares, anterior one tubular with four separate papillae along its lateral (lower) margin, located at anterior edge of snout; outermost papillae smaller than internal ones. Posterior nare as small opening located at midpoint between anterior nare and eye. One maxillary barbel on side of snout, inserted just above rictus. Maxillary barbel reaching pectoral-fin base. Two mental



**Fig. 1.** *Xylophius anachoretetes* new species, holotype, MNRJ 31923, 88,4 mm SL: Brazil, Goiás State, rio Tocantins below the dam of Serra da Mesa Hydropower Plant, in a marginal pond at the mouth of rio Preto, a right margin tributary of the rio Tocantins (currently under water in the Cana Brava Hydropower-plant reservoir). (a) dorsal view; (b) ventral view; (c) lateral view.

barbels, both smaller than maxillary. Inner mental barbel smallest, its length shorter than half-length of outer mental barbel. Inner mental barbel located just posterior to mouth opening, and at distance of one-quarter of mouth width from midventral axis of head. Outer mental barbel half the length of maxillary barbel, reaching or slightly surpassing transverse through mouth opening when adducted anteriorly. Outer mental barbel located on transverse posterior to inner

mental barbel, separated from it by distance greater than inner mental barbel length. Mouth subterminal, wider than snout with 22 (paratype) or 24 (holotype) fleshy, finger-like papillae along border of lower lip. Almost all papillae the same size and weakly dendritic with one to three minute branches (Fig. 2b). Anterior margin of snout with shallow medial notch (Fig. 2b). Gill opening small, restricted to valvular slit, covered by fleshy skin flap on ventral surface



**Fig. 2.** Ventral view of head and papillae on lower lip of: (a) *Xylophius magdalenae*, BMNH 1947.7.1.215.216, 70.0 mm SL; (b) *X. anachoretetes*, MNRJ 31923, holotype, 88.4 mm SL; (c) *X. melanopterus*, FMNH 99492, 101.5 mm SL; and (d) *X. lepturus*, FMNH 99489, 108.1 mm SL. Scale bar = 1 mm.

**Table 1.** Morphometric data for *Xylophius anachoretetes*.

	Holotype MNRJ 31923	Paratype MZUSP 89546
Standard length (mm)	88.4	25.6
Percents of Standard length		
Depth at dorsal-fin origin	13.2	14.1
Predorsal length	39.3	40.8
Prepectoral length	26.3	30.2
Prepelvic length	44.3	46.5
Preanal length	60.4	64.2
Length of caudal peduncle	28.0	29.4
Depth of caudal peduncle	8.0	8.3
Length of pelvic fin	13.8	14.0
Length of anal-fin base	15.0	13.9
Length of caudal fin	20.0	22.8
Length of pectoral spine	14.5	22.1
Length of humeral process	2.4	2.7
Length of posterior process of coracoid	6.6	5.9
Head length	33.8	39.2
Width at pectoral-fin insertion	25.6	30.0
Percents of Head length		
Maximum depth of head	38.4	42.1
Snout length	24.8	28.7
Eye diameter	1.5	2.4
Interorbital width	24.3	26.3
Length of maxillary barbel	57.2	42.6
Length between anterior and posterior nares	10.0	12.0
Length between posterior nare and orbit	5.1	4.6
Anterior internareal distance	17.7	16.7
Posterior internareal distance	23.8	25.1

of head. Gill membranes united to isthmus. Small genital papillae just posterior to anus.

Head, trunk and fins all covered by thick skin somewhat loosened from muscular tissues, particularly at bases of paired fins and on abdomen. Skin of head and trunk covered by *unculiferous* tubercles. Head tubercles larger than those on body. Most of head tubercles roughly hexagonal and depressed; tubercles on snout and maxillary barbel rounded, decreasing in size from proximal to distal tip of barbel. Five lateral rows of large tubercles extending from post-cephalic region to base of caudal fin. Prominent crest along dorsal midline from supraoccipital region to dorsal-fin origin, and from base of last dorsal-fin ray to caudal fin. Tubercles on all fin rays small and rounded; tubercles depressed and striated on interradial membranes. Skin tubercles larger and more tightly spaced on dorsal surface of body and head than on ventral surfaces. Tubercles on ventral surface minute and somewhat scattered, except those around mouth and just posterior to last anal-fin ray, which are more similar to dorsal-surface tubercles.

Sixteen latero-sensorial pores on head. Anterior branch of the supraorbital branch with five pores: one pore mesially, and two posterior to the anterior naris; fourth pore located mesially to a line between anterior and posterior nares; and

fifth pore located just in front of posterior naris. Two mesial pores, corresponding to epiphyseal and parietal branches, respectively. Four pores of the infraorbital branch of latero-sensory system; anteriormost dorsally close to rictus. Five pores of the preoperculomandibular branch; anteriormost pore ventrally close to rictus. Lateral line with 17/18 pores on left and right sides, respectively. Lateral line not extending onto caudal fin.

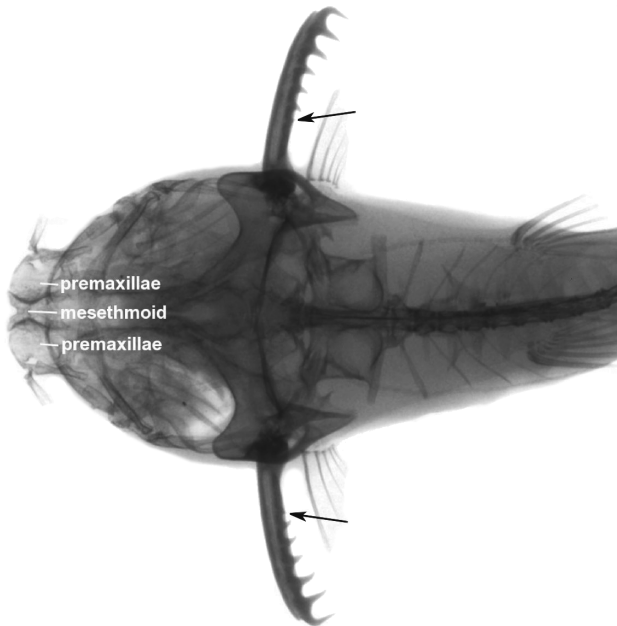
Total number of vertebrae 31, precaudal vertebrae 11, caudal vertebrae 20. Six pairs of ribs, first pair articulated with parapophyses of first free (sixth) centrum, and slightly larger than others. Ribs gradually decreasing in size caudally.

Dorsal fin I,3,i; roughly triangular, located slightly anterior to mid-standard length. Dorsal spinelet absent. Dorsal spine (second dorsal lepidotrichia) feeble. Anal fin ii,4,i; roughly semi-ovoid, its origin just posterior to tip of longest ray of

i,4/4,i; dorsal and ventral procurrent caudal-fin rays 2 and 4, respectively.

**Color in alcohol.** Ground color of body and head brown, ventral region slightly lighter than dorsal. Irregular light brown middorsal stripe on head from tip of snout to transverse through pectoral-fin origins; stripe widest in interorbital region. All barbels yellowish light brown. Two elongate, irregular, light brown blotches along dorsal midline of body: anterior one small, just in front of dorsal-fin base, posterior one large, extending from base of last dorsal-fin ray to vertical through midlength of anal-fin base. All fin rays and membranes dark brown; borders yellowish white.

**Distribution.** *Xylophius anachoretetes* is currently known only from two localities, one in the upper rio Tocantins (type locality) and the second from the upper rio Araguaia (Fig. 4).



**Fig. 3.** Radiograph of anterior region of *Xylophius anachoretetes*, MNRJ 31923, holotype, 88.4 mm SL, showing premaxilla lateral to mesethmoid, and completely separated from its pair. Arrows showing rudimentary serrae on pectoral spines.

abducted pelvic fin. Pectoral fin I,4,i; origin just posterior to cheek; profile roughly ellipsoid, tip reaching (paratype) or falling short of (holotype) midlength of pelvis when abducted. Pectoral spine thick with six developed retrorse serrae along its posterior margin, decreasing in size from distal tip to proximal base of spine. A rudiment of serrae (detectable only on x-ray imaging; Fig. 3, arrow) sprouts proximally. Ossified portion of pectoral spine shorter than first pectoral-fin ray. Pectoral slit just above base of last pectoral-fin ray. Pelvic fin i,4,i; roughly triangular; origin just posterior to vertical through dorsal-fin origin. Caudal-fin roughly rectangular, its distal margin truncate. Principal caudal-fin rays



**Fig. 4.** Known distribution of *Xylophius* species. Records of *Xylophius anachoretetes* represented by stars at the rio Tocantins-Araguaia system (highlighted). Type locality represented by a solid star. Other species represented are *X. melanopterus* (open squares); *X. lepturus* (solid squares); *X. kryptos* (open triangle); *X. magdalenae* (solid triangle; type locality); *X. lombarderoi* (open circle, type locality); *X. barbatus* (solid circle, type locality). Squares and solid triangle may represent more than one record.

**Ecological notes.** Both specimens were captured by day in shallow waters. Due to its diminished eyes and rough skin somewhat free from underlying muscles, together with its extreme rarity in collections, we speculate that *Xyliphius anachoretetes* is a cryptic fossorial species.

**Etymology.** The specific epithet of *Xyliphius anachoretetes* is from the Greek *anachoretetes*, meaning “one that retired from the world”, hermit, recluse, in allusion to the rarity of the only two specimens known, each one found alone and far apart. An adjective.

### Discussion

At least three synapomorphies of *Xyliphius* (Friel, 1994) are observed in the new taxon: 1) premaxillae separated from one another and displaced completely lateral to mesethmoid (Fig. 3); 2) row of fleshy papillae projecting anteriorly from lower lip (Fig. 2); and 3) unculi and unculiferous tubercles flattened. However, several anatomical features obtained through radiographs and external morphology show variation among *Xyliphius* species. The row of fleshy papillae on lower lip, unique to *Xyliphius*, is separable into at least two characters among representatives of the genus: the number of papillae, and the degree of development of its branches. *Xyliphius anachoretetes* shares with *X. magdalenae* and *X. kryptos* the presence of 22 or 24 papillae on lower lip (recorded specimens of *X. kryptos* with 22, 24, and 27 papillae; Taphorn & Lilyestrom, 1983), which is the lowest count among their congeners (*i.e.*, 25–28 in *X. lepturus*, 27–30 in *X. barbatus*, 28 in *X. lombarderoi*, and 27–29 in *X. melanopterus*). Although counts of the new species and *X. kryptos* might suggest variation related to size, these values are still the lowest of the genus. Furthermore, in the present study, such a variation was not observed in other examined species. Records of a size series with large SL range of *X. barbatus* (44.5–93.5 mm SL, Calviño & Castello, 2008: 56) reveal count numbers (28–30) markedly higher than the range of *X. anachoretetes* and *X. kryptos*. In the original description of *X. melanopterus*, Orcés (1962) recorded 24 papillae on the lower lip of the holotype (p.53), which was the only specimen available at that time. That count differs from our examination of the holotype. However, in the same page, Orcés (1962) remarked that the lower lip has 24 papillae, except by one or two on the rictus (p.53: “Labio inferior con 24 papilas ramificadas, salvo una o dos de las rictales”). Adding the rictal papillae (1+2) to the 24 counted by Orcés equals exactly the number (27) observed herein.

The lack of material makes any inferences concerning the direction of change (increase/decrease on the number of lower-lip papillae) too speculative and premature, mainly due to absence of comparative information in other aspredinids. However, an additive character-state hypothesis could be tested against relevant ontogenetic sequences when they are available. This assertion could also be applied to the

degree of development of lower-lip papillae branches. Among *Xyliphius* species, it is possible to observe four conditions of this character: unbranched papillae (*X. magdalenae*; Fig. 2a); papillae bearing minute branches (*X. kryptos* and *X. anachoretetes*; Fig. 2b); papillae bearing developed branches (*X. melanopterus*; Fig. 2c); and papillae bearing many large branches (*X. barbatus*, *X. lombarderoi* and *X. lepturus*; Fig. 2d). Also, lack of ontogenetic sequences does not allow the formulation of a testable hypothesis.

Another character that helps to diagnose *Xyliphius anachoretetes*, except from *X. magdalenae*, is the presence of six developed retrorse serrae along posterior border of pectoral-fin spine. A proximal rudiment of serrae (detectable only on x-ray imaging; Fig. 3, arrow) was not considered in the count. Orcés (1962: 53, and table 1) recorded six/seven serrae on pectoral spine for *X. melanopterus* (p. 53: “Espina pectoral con 6/7 denticulaciones espiniformes en su borde posterior, inclusive una rudimentaria, cercana a la base”). However, the diagnosis in the same page reported six to eight serrae on pectoral spine (p. 53: “(...) 6 a 8 denticulaciones tras la espina pectoral”). Examination of the holotype of *X. melanopterus* as reported herein reveals seven/eight serrae hooks on the left and right pectoral spine, respectively, plus a proximal minute serrae in each one, perceived with the help of a thin nail. In all specimens examined and for which x-ray images were taken, except *X. magdalenae* (USNM 120224), there was an extra rudiment of serrae not detected on manual examination, but only through x-ray imaging. Since there are no available x-ray images of the holotype of *X. melanopterus*, it is not possible to discard the presence of an additional rudimentary serrae. *Xyliphius magdalenae* showed variation on the number of developed serrae on pectoral spine among specimens examined, ranging from four to nine, seemingly related to body length. However, this correlation was not observed in *X. anachoretetes*, the two known specimens show six serrae each and have sizes of 88.4 mm SL (holotype), and 25.6 mm SL (paratype). Despite of this, it is worthy to note that this variation observed in *X. magdalenae* comprehends a smaller size range sample (32.0–73.0 mm SL) than *X. anachoretetes* type series.

Among radiographed specimens, *X. anachoretetes* presents fewer dorsal procurrent rays than the remaining species examined, *X. magdalenae*, *X. melanopterus*, and *X. lepturus* (two vs. three to five), and the total count of caudal-fin rays is lower than all other specimens examined (16 vs. 17 to 21), but one specimen identified as *X. melanopterus* (FMNH 99483).

A more comprehensive study is needed to shed light on possible ontogenetic and geographic variation within species of the genus. Although currently known from only two specimens, it is timely to provide a scientific description of the new species with material at hand. *Xyliphius anachoretetes* is the first record of the genus from the central portion of the Brazilian shield, and also from basins draining into the lower Amazon. The holotype was sampled during

several exhaustive fish surveys in the upper portion of rio Tocantins system between 1996-2003, during the establishment of the Serra da Mesa Dam. Currently, the type locality is underwater in the Cana Brava Hydropower-plant reservoir that began operations in 2002. Considering the impact of transforming a fast-flowing river into a reservoir with still waters, we suspect that the present conditions of this portion of upper Tocantins does not support viable populations of *Xyliphius anachoretetes* at its type locality. Furthermore, increasing demand for watershed spaces by the hydroelectric industry will probably lead to the construction of more dams in several drainages in Central Brazil, mainly rio Tocantins basin, to generate electric energy. This situation leads to alteration of watercourses, and subsequently, the potential loss of many undescribed or endemic species. Thus, documenting new species is a prerequisite for conservation measures. Furthermore, having the species formally named will hopefully stimulate search for additional specimens.

**Material examined.** *Ernstichthys* sp.: **Brazil**, Goiás State: MNRJ 12574, 1, 29.0 mm SL, Minaçu, rio Boa Nova, 13°52'S 48°21'W. Mato Grosso State: MZUSP 37814, 3, 1 c&s, 20.6-21.9 mm SL, Aripuanã, Igarapé Ingazeiro, 20 km upstream from mouth of rio Canumã, rio Aripuanã, downstream from Dardanelos, 09°58'S 59°19'W. *Hoplomyzon sexpapistoma*: **Venezuela**, Barinas: MCNG 5376, 1 paratype, c&s, 20.9 mm SL, Apure River drainage, rio Masparro at site of Masparro Dam, 08°50'40"N 70°06'00"W. *Xyliphius barbatus*: **Argentina**, Santa Fe: MLP 6798, holotype, 92.0 mm SL, rio Paraná in Rosario. *Xyliphius lepturus*: **Ecuador**, Napo: FMNH 99487, 2, 99.1-99.6 mm SL, rio Napo, 10.7 km upstream from the bridge at Coca, in main stream, 0°32'36"S 77°02'54"W; FMNH 99489, 1, 107.1 mm SL, rio Aguarico, few km upstream from mouth of rio Eno, 0°11'S 76°30'W; FMNH 99491, 1, 115.1 mm SL, rio Coca, downstream from rio Sardinas confluence, 0°06'0"S 77°12'30"W. *Xyliphius magdalenae*: **Colombia**, Girardot: BMNH 1947.7.1.215.216, 2, 35.0-70.0 mm SL, x-rayed; FMNH 56039, holotype, 32.0 mm SL, x-rayed. Tolima, Honda: IAvH-P 4127, 1, 72.0 mm SL, rio Magdalena, 05°15'N 74°50'W; USNM 120224, 2, x-rayed, 51.0-73.0 mm SL, CZUT-IC 1288, 1, 72.9 mm SL; *Xyliphius melanopterus*: **Ecuador**, Napo: DU T.31.79, 1 c&s, ca. 90.0 mm SL; FMNH 99492, 1, 101.1 mm SL, rio Napo near Tiputini, 0°47'0"S 75°33'W; FMNH 99493, 1, 103.2 mm SL, rio Aguarico, about 15-20 min downriver from Destacamento Zancudo, 0°33'S 75°27'W; MEPN 3025 (ex-OV 2021), holotype, 114.0 mm SL, bajo rio Pucayacu no lejos de su boca en el Bobonaza, cerca de Montalvo, aprox. 02°04'S 76°58'W.

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